

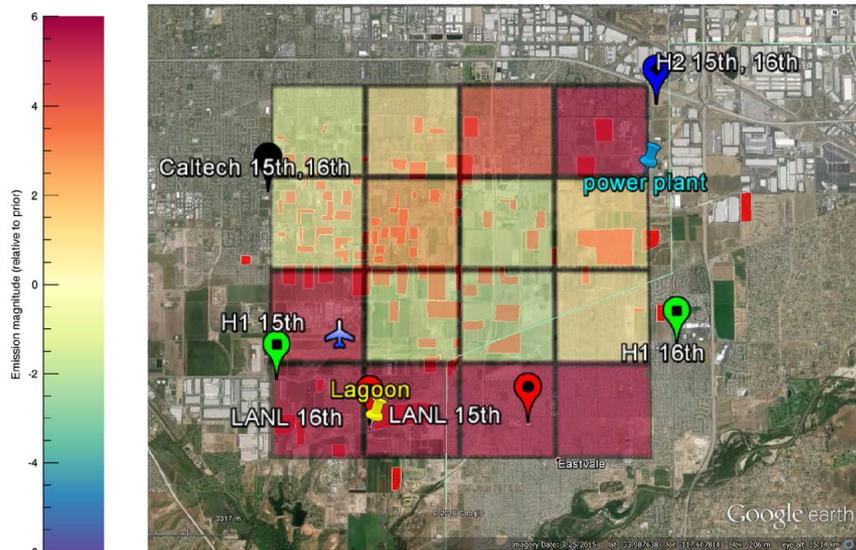


Regional Column CH₄ (& CO₂) Observations by Off-the-Shelf Mobile Solar Spectrometers Detect Reductions in Dairy Emissions in Chino *Dubey CMS-PI*



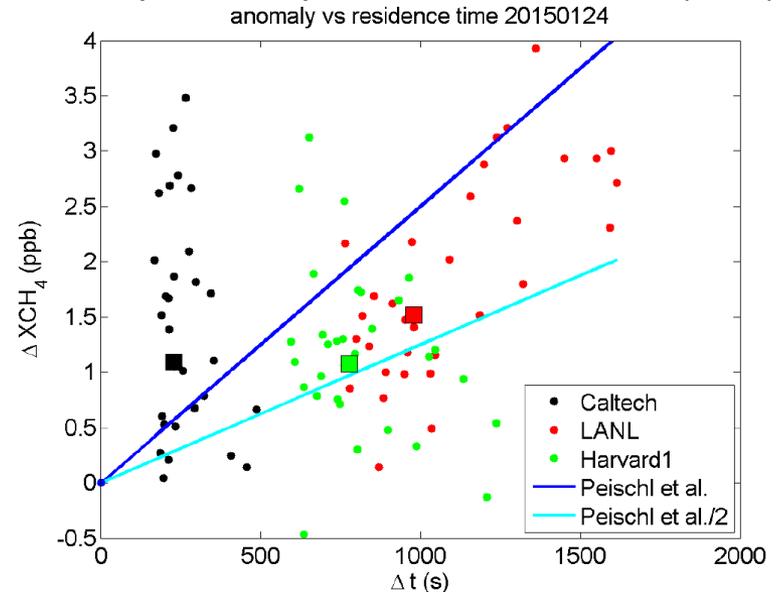
Viatte et al ACP, 2016; Chen et al ACP, 2016; Hedelius et al AMT, 2016

- Satellite CH₄ & CO₂ observations can evaluate estimated fluxes & help monitor progress on COP21 goals. Currently, LEO has limited time & spatial coverage that GEO should soon overcome. These promising space applications demand validation by ground based high resolution solar spectrometers (TCCON).
- **However, TCCONs are large, expensive, complex and stationary with limited global coverage**
- Affordable of-the-shelf compact low resolution solar spectrometers were calibrate consistently and with the TCCON standard to show they have the precision & stability for verification.
- We deployed 4 mobile spectrometers in Los Angeles and observed downwind-upwind column concentration gradients and use them to evaluate bottom-up CH₄ emissions and trends from dairy and fossil fuels in Chino



4 spectrometers (LANL, Caltech & Harvard) made distributed column CH₄ & CO₂ measurements to evaluate dairy (red) & fossil emissions (yellow) inventory in Chino (2 km grid)

Downwind-Upwind column CH₄ anomaly vs residence time or (wind speed)⁻¹ & their means (box) for the 3 instrument pairs compared with in situ data (lines).



- Affordable differential CH₄ & CO₂ column observations to constrain fluxes in isolated areas are feasible
- Our top-down CH₄ emissions are on low end of '10 estimates indicating urban growth & less dairy in '15